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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/759,354	01/16/2004	Takashi Kaito	S004-5191	9905

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EXAMINER	
MCDONALD, RODNEY GLENN	
ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/759,354	KAITO ET AL.	
	Examiner	Art Unit	
	Rodney G. McDonald	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 October 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-8,31-35 and 37-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-8,31-35 and 37-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10-8-08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 10, 2008 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3, 5-7 and 38-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita (U.S. Pat. 5,956,565) in view of Hamamura et al. (U.S. Pat. 6,303,932) and Matsui et al. (U.S. Pat. 5,229,607).

Regarding claim 1, Yamashita teaches a method of cross-section processing and observation. Yamashita teaches a first step of processing at least one predetermined area in a surface of a sample to form a target cross-section. (i.e. a focused ion beam for the semiconductor device was irradiated on the cleaved surface so as to carry out sputter etching over the sectional are of the wiring). A second step of observing the target cross-section by scanning the target cross-section with a probe of a scanning probe microscope and detecting a physical quantity produced between the probe and the target cross-section. (i.e. the cross section of the semiconductor device (10) was scanned with the cantilever (16) using an AFM. Then atomic force between the semiconductor device (10) and the cantilever (16) was measured and the cross-section of the semiconductor device (10) was observed). The roughness is the physical quantity observed. (Column 5 lines 66-68; Column 6 lines 1-26; Column 2 lines 14-16) Yamashita teaches that in the first step the predetermined area is processed by etching the predetermined area with a focused energy beam. (Column 6 lines 9-12)

Regarding claim 3, Yamashita teaches that focused energy beam is a focused ion beam. (Column 6 lines 9-12)

Regarding claim 5, Yamashita teaches the first and second steps are carried out using a system for cross-sectional processing and observation, the system having a unit for processing the surface of the sample to expose a target cross-section thereof, and a scanning probe microscope unit for observing the target cross-section. (See Fig. 1)

Regarding claim 6, Yamashita teaches a method of cross-sectional processing an observation. Yamashita teaches a first step of processing at least one predetermined area in a surface of a sample to expose a target. (i.e. a semiconductor is cleaved to expose a side.) (Column 5 lines 66-68) A second step of sputter etching with an ion beam on the cleaved side to reduce the surface roughness of the surface in the surface of the sample. (i.e. removing the damaged portion) (Column 6 lines 1-9) Then a stepped portion is formed according to differences in material from among the layers. (i.e. The layer of aluminum is sputter etched by focused ion beam etching. The aluminum etches at a faster rate than the other layers such that an unevenness is formed.) (Column 6 lines 9-17) A third step of observing the exposed cross-section with a scanning probe microscope. (i.e. the cross-section of the semiconductor device is scanned with an AFM.) (Column 6 lines 18-23)

Regarding claim 7, Yamashita teaches a step of finishing the exposed cross-section into a mirror face before the stepped portion is formed. (i.e. reducing the roughness is considered to be mirror finishing) (Column 6 line 2)

Regarding claim 39, Yamashita teach the step of etching the target cross-section after the first step and before the second step. (Column 6 lines 1-17)

Regarding claim 41, Yamashita teach the step of etching comprises etching the target cross-section using a gas blowing unit. (Column 6 lines 52-59)

The difference between Yamashita and the present claims is that the etching and observing being carried out in the same vacuum chamber is not discussed (Claims 1, 5) and utilizing an argon beam is not discussed (Claims 38, 40).

Regarding the etching and observing being carried out in the same vacuum chamber (Claim 1), Hamamura et al. teach proving in a single apparatus a SIM (scanning ion probe microscope), a focused ion beam etching device and a contact probe. All are in the same vacuum chamber 5. (Fig. 1; Column 6 lines 5-34; Column 8 lines 40-46) Matsui et al. teach combining a FIB device with a microscope in a single apparatus. (Column 11 lines 22-25; See Abstract)

Regarding claims 38, 40, Hamamura et al. teach using a gas plasma ion source. "Gas" covers argon. (Column 5 lines 25-28-29)

The motivation for utilizing the features of Hamamura et al. is that it allows for obtaining a high resolution image. (Column 2 line 46)

The motivation for utilizing a combination apparatus as taught by Matsui et al. is that it allows for utilizing a single evacuation system. (Column 3 lines 45-49)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Yamashita with the features of Hamamura et al. and Matsui et al. because it allows for utilizing a single evacuation system to produce high resolution images.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita in view of Hamamura et al. and Matsui et al. as applied to claims 1, 3, 5-7 and 38-41 above, and further in view of Kane et al. (U.S. Pat. 6,670,717).

The difference not yet discussed is that the first step includes a step of decomposing an organic metal gas with the focused ion beam in a predetermined location of the sample to make an electrode and an interconnect after carrying out the etching process with a focused ion beam. (Claim 4)

Regarding claim 4, the first step includes the substep including a substep of decomposing an organic metal gas with a focused ion beam in a predetermined location of the sample to make an electrode and an interconnection after carrying out the etching process with the focused ion beam. Fig. 3 shows the electrode and interconnection. (Column 5 lines 10-17; Column 8 lines 2-5; Fig. 3)

The motivation for utilizing the features of Kane et al. is that it allows for forming an electrode and interconnection. (Column 5 lines 10-17; Column 8 lines 2-5; fig. 3)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Kane et al. because it allows for forming an electrode and interconnection.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita in view Hamamura et al. and Matsui et al. as applied to claims 1, 3, 5-7 and 38-41 above, and further in view of Yang et al. (U.S. Pat. 6,207,575).

The difference is that repeating the step of exposing the target surface with the focused ion beam and the step of observing the exposed section with the probe being repeated sequentially is not discussed. (Claim 8)

Yang et al. teach observing and etching repeatedly until the desired profile is achieved. (Column 6 lines 26-57)

The motivation for repeating the etching and the observing is that it allows for generation of a particular profile. (Column 6 lines 26-57)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have etched and observed repeatedly as taught by Yang et al. because it allows for generation of a particular profile.

Claims 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita in view Hamamura et al. and Matsui et al. as applied to claims 1, 3, 5-7 and 38-41 above, and further in view of Hantschel et al. (U.S. Pat. 6,668,628).

The differences not yet discussed are that wherein the physical quantity measured is selected from the group consisting of an electrical conductivity, a dopant concentration, a dielectric constant, a potential, a leaking magnetic field and a spin interaction of the sample (Claim 31) and wherein the physical quantity measured is selected from the group consisting of a hardness, a friction, and an elasticoviscosity (Claim 32).

Regarding claims 31, 32, Hantschel et al. teach that a scanning probe can be used to determine topography (i.e. roughness related to friction), electrical and optical properties. (See Abstract)

The motivation for utilizing the features of Hantschel et al. is that it allows for measuring topography. (Column 3 lines 40-42)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Hantschel et al. because it allows for measuring topography.

Claims 33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita in view Hamamura et al. and Matsui et al. as applied to claims 1, 3, 5-7 and 38-41 above, and further in view of Okazaki et al. (U.S. Pat. 6,437,343).

The differences not yet discussed is that utilizing a microscope unit to observe the position of the probe is not discussed (claim 33) and the microscope unit comprising an optical microscope is not discussed (claim 34).

Regarding claims 33, 34, Okazaki et al. teach utilizing an optical microscope to observe the position of the probe. (Column 18 lines 4-22)

The motivation for utilizing an optical microscope is that it allows for observing the position of the probe. (Column 18 lines 4-22)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Okazaki et al. because it allows for observing the position of the probe.

Claims 33 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita in view Hamamura et al. and Matsui et al. as applied to claims 1, 3, 5-7 and 38-41 above, and further in view of in view of Hitachi (Japan 10-223170).

The differences not yet discussed are utilizing a microscope unit to observe the position of the probe (Claim 33) and the microscope unit comprising a SEM (Claim 35).

Hitachi teaches utilizing an SEM to determine the position of the probe. (See Abstract)

The motivation for utilizing a SEM is that it allows for observing the position of the probe. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a SEM as taught by Hitachi because it allows for observing the position of the probe.

Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita in view Hamamura et al. and Matsui et al. as applied to claims 1, 3, 5-7 and 38-41 above, and further in view of in view of Azuma et al. (U.S. Pat. 5,683,547).

The difference not yet discussed is where the mirror finishing is conducted by irradiating an electron beam in parallel with blowing of an etching gas.

Azuma et al. teach irradiating an electron beam on a sample in an etching gas atmosphere. (See Abstract) The nozzle of Fig. 1. causes the blowing of the etching gas in parallel with the electron beam. (See Fig. 1) It is mirror finished because the surface is flat. (See Fig. 24a-24c)

The motivation for utilizing an electron beam with an etching gas is that it allows for local etching. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have irradiated an electron beam in parallel with blowing of an etching gas as taught by Azuma et al. because it allows for local etching.

Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita in view Hamamura et al. and Matsui et al. as applied to claims 1, 3, 5-7 and 38-41 above, and further in view of in view of Ishida (U.S. Pat. 6,117,347).

The difference not yet discussed is wherein the step of etching comprises etching the target cross-section using a laser beam irradiating unit (Claim 42)

Regarding claim 42, Ishida teach that laser etching can be used in place of ion beam etching or plasma etching. (See Abstract)

The motivation for utilizing the features of Ishida is that it allows etching. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Ishida by utilizing the features of Ishida because it allows for etching.

Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita in view Hamamura et al. and Matsui et al. as applied to claims 1, 3, 5-7 and 38-41 above, and further in view of in view of Ohira (Japan 2001-60568).

The difference not yet discussed is wherein the second step includes the step of processing the surface of the sample by cutting the surface of the sample. (Claim 43)

Regarding claim 43, Ohira teach processing the surface by cutting the wafer after measuring. (See Abstract)

The motivation for utilizing the features of Ohira is that it allows for improving the quality of the semiconductor chip. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Ohira because it allows for improving the quality of the semiconductor chip.

Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita in view Hamamura et al. and Matsui et al. as applied to claims 1, 3, 5-7 and 38-41 above, and further in view of in view of Silver et al. (U.S. Pat. 3,612,954).

The difference not yet discussed is wherein the second step includes the step of processing the target cross-section by applying a voltage between the probe and the target cross-section to perform anodization and thereby form an insulating layer on the target cross-section (Claim 44).

Regarding Claim 44, Silver et al. teach anodizing by applying a voltage. (Column 2 lines 50-69)

The motivation for utilizing the features of Silver et al. is that it allows for anodizing the feature. (Column 2 lines 50-69)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Silver et al. because it allows anodizing the feature.

Response to Arguments

Applicant's arguments filed October 10, 2008 have been fully considered but they are not persuasive.

In response to the argument that Hamamura does not teach the specific apparatuses and devices disposed in the single vacuum chamber for performing the specific steps recited in independent claims 1 and 5, it is argued that the combination of references recite the required steps. Hamamura suggests utilizing a single vacuum chamber for the various processes. (See Hamamura discussed above)

In response to the argument that Matsui does not teach the use of these devices in a single vacuum chamber for performing the specific processing and observation steps recited in independent claims 1 and 5, it is argued that the combination of references teach the required steps. Hamamura teach the single vacuum chamber for the specific processing and observation. (See Hamamura discussed above)

In response to the argument that the Examiner's motivation is improper, it is argued that the motivation for utilizing the features of Hamamura is that it allows for viewing high resolution images. (See Hamamura discussed above)

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M-Th with every Friday off..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Rodney G. McDonald/
Primary Examiner, Art Unit 1795

Rodney G. McDonald
Primary Examiner
Art Unit 1795

RM
December 8, 2008